

RESERV
PATENT SPECIFICATION

D-6



816,330

Date of Application and filing Complete Specification: Nov. 7, 1955.

No. 31818/55.

Application made in Germany on Nov. 8, 1954.

Complete Specification Published: July 8, 1959.

Index at acceptance:—Classes 2(5), R2C(2:8:12:13:15:16:17), R2(M:P1:T2), R29C(2:8:12:13:15:16:17), R29(M:P:T2); 2(6), P2A, P2C(2:9:13A:13C:14A:18), P2(D1A:K8:T2A), P4C(13A:13C:14A), P4D1A, P7A, P7C(13A:14A), P7(D2A1:K2:T2A), P8A, P8C(2:9:13A:13B:13C:14A:18), P8D(2A:3A), P8(K2:T2A); and 15(2), GA12, GB2(A2:B1), GC2A(8:9), GC2A12(A1:A5:A8:B1:B2:B4).

International Classification:—C08d, g. D06m.

COMPLETE SPECIFICATION

Improvements in and relating to the Resin Treatment of Textiles

I, EGON ELÖD, of German nationality, of Haus Carolina, Badenweiler, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to a process for improving low-grade, light, loosely woven fabrics, particularly fine muslin fabrics, which contain cotton or regenerated cellulose or both.

It is an object of the invention to improve the qualities of such fabrics, particularly as regards elasticity and resilience so that they can be used as linings to give shape to and retain the shape of articles of clothing.

Attempts to improve textiles by treating them with natural and/or synthetic rubber have not given satisfactory results. When a rubber dispersion is used for the impregnation of textiles, it is essential to incorporate certain additives such as vulcanisation agents, vulcanisation accelerators or ageing inhibitors in the dispersions, in order to make the rubber elastic, non-adhesive, non-ageing and resistant to the action of solvents. The compulsory use of such additives, however, is attended by a number of serious disadvantages. For example, the additives present in the dispersion in an undissolved state are precipitated in an undesirable manner, the reliability and uniformity of their action thus being diminished. A further disadvantage is that fabrics impregnated with rubber emit an unpleasant odour when they become warm and even when they are stored.

After extensive experiment, it has been found that low-grade, light, loosely woven fabrics can be converted into high-quality structures with good elastic and resilient pro-

perties by treating them with natural and/or synthetic rubber, without the addition of the usual vulcanisation agents, which have hitherto been considered to be indispensable.

According to the invention there is provided a process for improving low-grade, light, loosely woven fabrics, particularly fine muslin fabrics, which contain cotton and/or regenerated cellulose which comprises impregnating the fabrics with aqueous dispersions or emulsions containing natural and/or synthetic rubber and water-insoluble precondensates or intermediate condensates of amino-formaldehyde resins having methylol groups that are able to interact with reactive groups of rubber molecules, said cross-linkage-forming precondensates or intermediate condensates themselves being thereby converted into their final insoluble state, the precondensates or intermediate condensates being present in a quantity by weight greater than the quantity by weight of rubber present, and whereby the dispersion or emulsion is preferably introduced into the fabric in the form of a foam and, on heating, the fabric is converted into an elastic resilient product. As a result, the rubber acquires quantities which are substantially equivalent to those of vulcanised rubber. Textiles impregnated with the dispersions according to the invention can be hardened satisfactorily by heating and are converted into non-adhesive dry products fulfilling all requirements in respect of handle, elasticity or resistance to creasing. They also enjoy the great advantage of being resistant to ageing and to the action of dry-cleaning agents.

Suitable substances for effecting a cross-linkage are water-insoluble precondensates of urea and formaldehyde, precondensates of melamine and formaldehyde and precondensates of urea or melamine with form-

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5 aldehyde, which are modified with alkyd resins. It has been found that, *inter alia*, pre-condensates which have been etherified with alcohols, such as butanol or propanol, preferably butanol, are especially suitable.

10 It is well known that in the vulcanisation of rubber, the quantity of sulphur or sulphur compounds used and the amount of vulcanisation accelerator added are varied in accordance with the properties required in the vulcanised product. In the present invention by means of which the nature or synthetic rubber is converted into the desired state by pre-condensation or intermediate condensation products of synthetic resins capable of forming cross-linkages, the quantity of the cross-linkage-forming substance required will also vary in accordance with the type of synthetic resin precondensate used and the effect desired. In each individual case it is therefore advisable to determine by prior experiments the amount of cross-linkage-forming substance needed to produce the desired properties in the finished product, for example, handle, elasticity or resistance to creasing. In this connection it should be pointed out that the amount of cross-linkage-forming substance used has a very marked effect on the resistance to swelling of the treated fabric during dry cleaning operations. This applies in particular to the resistance to chlorinated hydrocarbons such as trichloroethylene and the like.

15 In general it has been found advisable that the precondensates or the mixtures of pre-condensates or synthetic resins which are capable of forming cross-linkages should be present in excess in the dispersion as compared with the rubber or synthetic rubber content thereof. In addition to the rubber and the cross-linkage-forming precondensates of synthetic resins, the dispersion may also contain other synthetic resins having no cross-linkage-forming properties. Furthermore, the dispersion can also contain one or more other substances such as pigments, dyes, optical brighteners, softeners, water-repelling agents, mothproofing agents, fire-proofing agents and bactericides.

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Because a rubber material is used, fabrics treated according to the invention are characterised by excellent elastic properties, good crease-resisting properties and the complete absence of the undesirable features or disadvantages produced by the use of vulcanisation accelerators and anti-ageing agents. As has been found by experiment, very thin woven fabrics, such as loosely woven muslin (bandage muslin), are particularly suitable for treatment by the present process. The processing of very thin woven fabrics such as bandage muslin can advantageously be carried out by superimposing several layers of muslin, arranging the material crosswise if necessary, the multi-layered structure thus obtained then

being subjected to the treatment. In the course of the treatment, the individual layers become firmly united with one another by adhesion. In some cases it has been found preferable to roughen one or both surfaces of the fabric to be treated before carrying out the process.

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The impregnation of the fabric to be treated can be effected by any known method. The preferred method is first to make a foam of the dispersion and then to introduce it into the fabric under pressure. This can be done, for example, by passing the fabric through a pair of rolls with an adjustable gap, thus pressing in the foam. If very loosely woven or sensitive textiles are to be treated, they should first be subjected to a surface stabilising process by applying, for example, a small quantity of adhesive to the surface, preferably on one side only, in order to stiffen the surface without adversely affecting the porosity of the material. Impregnation of fabrics of which the outer surface on one side has been pre-stiffened is preferably carried out by pressing in the dispersion, preferably in the form of a stable foam, on that side of the fabric which has not been pre-stabilised. The treated fabric is then cured by a simple heating treatment.

According to one embodiment of the invention, the impregnated and dried material is subjected to after-treatment with a solution or dispersion of aminoformaldehyde resins, for example, a precondensate or intermediate condensate of urea and formaldehyde. Precondensates or intermediate condensates of formaldehyde with melamine or melamine derivatives have proved eminently satisfactory for the purpose of after-treatment. Following this after-treatment, the products are dried and the resin is converted into its final insoluble state by heating. This process can be speeded up in known manner by the addition of condensation catalysts. By means of such after-treatment, the properties of the fabric, particularly those with reference to handle and resistance to creasing, to ageing and to dry cleaning can be still further improved.

In the following examples the parts and percentages are by weight.

EXAMPLE 1

A dispersion is made from 100 parts of a 60% butanol solution of a water-insoluble precondensate of urea and formaldehyde which has been etherified with butanol and modified with 30% of an alkyl resin (formed from adipic acid and trimethylolpropane by adding 3 parts of an anion-active highly sulphonated fatty acid and 50 parts of a 1% solution of casein and stirring briskly, water being added to give a 40% dispersion. Then 8 parts of a 40% aqueous solution of ammonium nitrate is added and the pH value of the dispersion is adjusted by the addition of ammonia until it is between 6.5 and 7.5.

This dispersion is now mixed with 120 parts of a neutralised 30% dispersion of a copolymer of butadiene and acrylonitrile ("Perbunan," Registered Trade Mark) with 25% acrylonitrile; 20 parts of a 10% gelatine solution and 10 parts of a 50% solution of an anion-active fatty alcohol sulphonate are then introduced. In order to stabilise the surface of a low-grade, light, loose-woven fabric 5 a foam is made from the dispersion which is diluted to a strength of 10% by adding water, and this foam is applied to the surface of the textile, the latter then being dried by heating for 10 minutes at 100° C. After the 10 fabric has been stabilised in this way it is impregnated with the same foam—having, however, a dry content of 25%—and again cured at 100° C. The fabric absorbs approximately its own weight of binding agent.

15 **EXAMPLE 2**

As described in Example 1 a 35% dispersion is made from 85 parts of a 60% solution in butanol of a water-insoluble butylated precondensate of urea and formaldehyde and a 20% dispersion of a polymethyl acrylate are then stirred in carefully. Enough ammonia is then cautiously added to adjust the pH value to about 6.5 and 100 parts of a 30% dispersion of a butadiene-styrene copolymer containing 25% styrene and 20 parts of a 10% aqueous polyvinyl alcohol solution 25 are also added.

30 A low-grade, light, loosely woven fabric, the surface of which has been pre-stiffened by sprinkling it with a 10% aqueous dispersion of a butylated precondensate of urea and formaldehyde and applying heat is then impregnated with the dispersion, which is diluted to 20%, and cured for 8 minutes at 35 110° C.

35 To improve the resilience, the handle and the resistance to dry-cleaning agents, the fabric is subjected to a second impregnation with a 7.5% aqueous solution of a precondensate of melamine and formaldehyde to which 10 g. 40 $ZnCl_2$ is added for every litre of liquor, to act as a catalyst. The fabric is then dried for 10 minutes at 110° and condensed for 3 minutes at 145° C.

45 **EXAMPLE 3**

50 Twenty parts of a 50% aqueous solution of a non-ionic fatty alcohol sulphonate are added to 100 parts of a 60% butanol solution of a melamine-formaldehyde precondensate that has been etherified with butanol and the mixture is emulsified by violent agitation. While the mixture is stirred continuously, it is diluted by the addition of 100 parts of water. Then after the introduction of 10 55 parts of a 40% ammonium nitrate solution, 100 parts of a 40% "Positex," Registered Trade Mark, dispersion (natural latex with positively charged rubber particles) are added

the low-grade, light, loosely woven fabric is then impregnated with this melamine-formaldehyde resin-rubber dispersion after the latter has been diluted until the dry content is reduced to 25% and is then heated for 60 minutes at 110° C.

60 **WHAT I CLAIM IS:—**

1. A process for improving low-grade, light, loosely woven fabrics, particularly fine muslin fabrics, which contain cotton and/or regenerated cellulose which comprises impregnating the fabrics with aqueous dispersions or emulsions containing natural and/or synthetic rubber and water-insoluble precondensates or intermediate condensates of aminoformaldehyde resins having methylol groups that are able to interact with reactive groups of the rubber molecules, said cross-linkage-forming precondensates or intermediate condensates themselves being thereby converted into their final insoluble state, the precondensates or intermediate condensates being present in a quantity by weight greater than the quantity by weight of rubber present, and whereby the dispersion or emulsion is preferably introduced into the fabric in the form of a foam and, on heating, the fabric is converted into an elastic resilient product.

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2. A process as claimed in claim 1, characterised in that the quantity by weight of water-insoluble precondensate or intermediate condensate of the synthetic resins added to the rubber dispersion is such that because of the cross-linking during the heat treatment products are obtained that correspond in their properties to vulcanised rubber.

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3. A process as claimed in claim 1 and claim 2, characterised in that the precondensates and intermediate condensates used as cross-linkage-forming substances are employed in a modified state, for example, precondensates or intermediate condensates etherified with alcohols.

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4. A process as claimed in any of claims 1 to 3, characterised in that precondensates or intermediate condensates of urea or melamine with formaldehyde which have been etherified with butanol are used.

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5. A process for treating fabrics characterised in that the fabric treated according to claims 1 to 4 is subjected to after-treatment with a solution or dispersion of precondensates or intermediate condensates of amino resins, for example, a precondensate or intermediate condensate of urea and formaldehyde or melamine and formaldehyde is dried and if necessary is subjected to further heat treatment.

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6. A process as claimed in any of claims 1 to 5, characterised in that the fabric is subjected to impregnation without pre-stiffening of the surface layer or surface layers, the impregnated fabric then being processed according to claims 1 to 5.

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7. A process for treating fabrics substantially as described in any of the foregoing examples.

8. Fabrics when treated by the process as claimed in any preceding claim.

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Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1959.
Published by The Patent Office, 35, Southampton Buildings, London, W.C.2, from which
copies may be obtained.